Advanced climate and regional model validation

for societal applications

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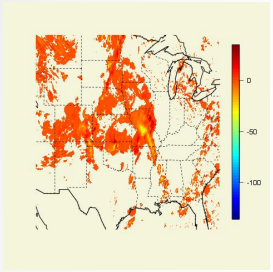
2014 CESM Societal Dimensions Working Group Meeting

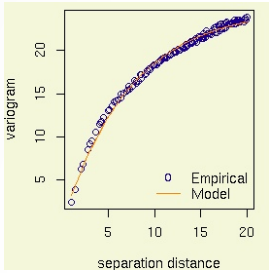
Spatial Methods

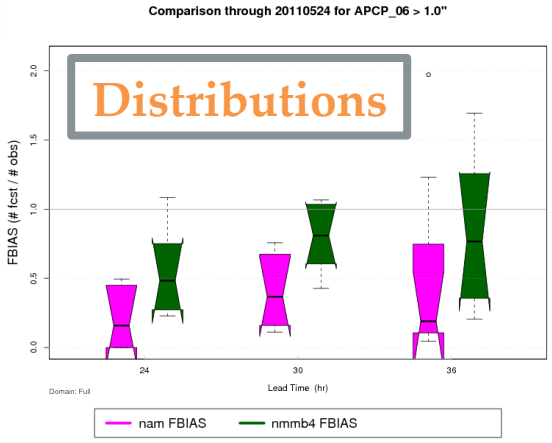
MODE

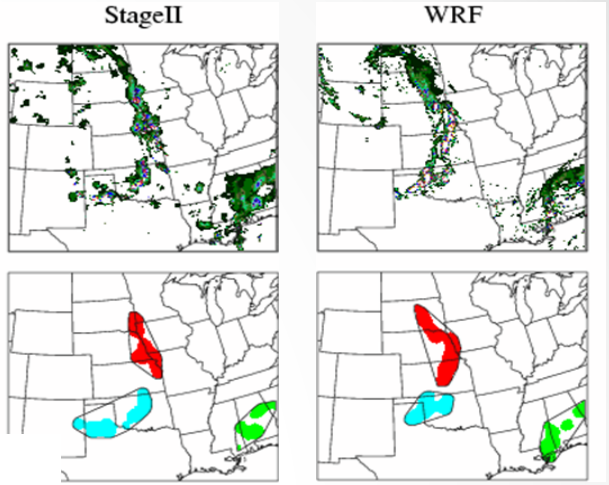
SPCT

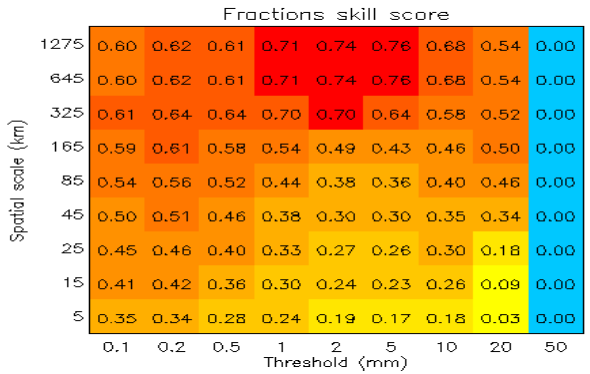
Distributions

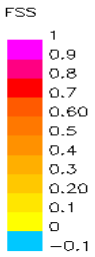










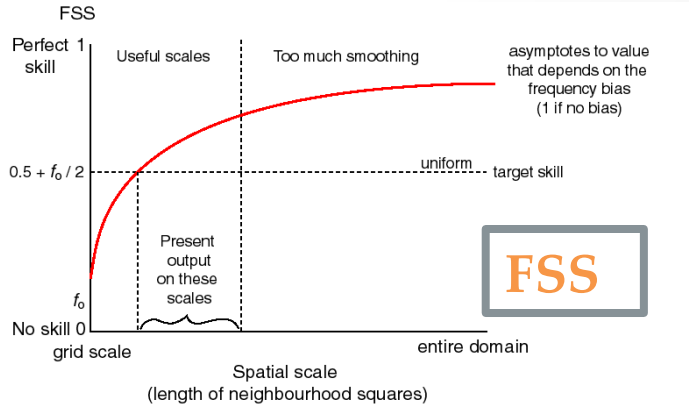


good performance

Quilt plots

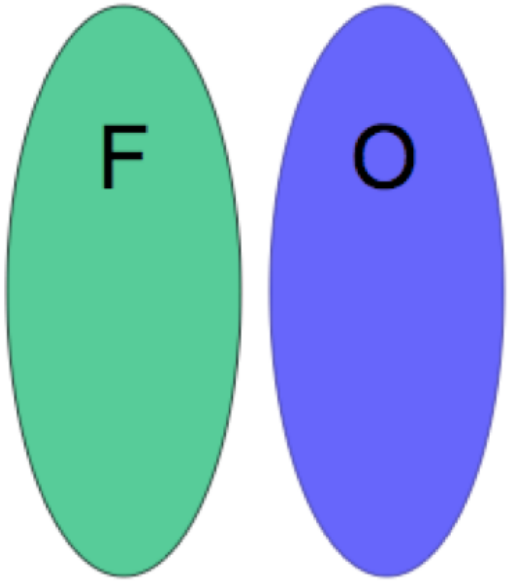
poor performance

Image Warping

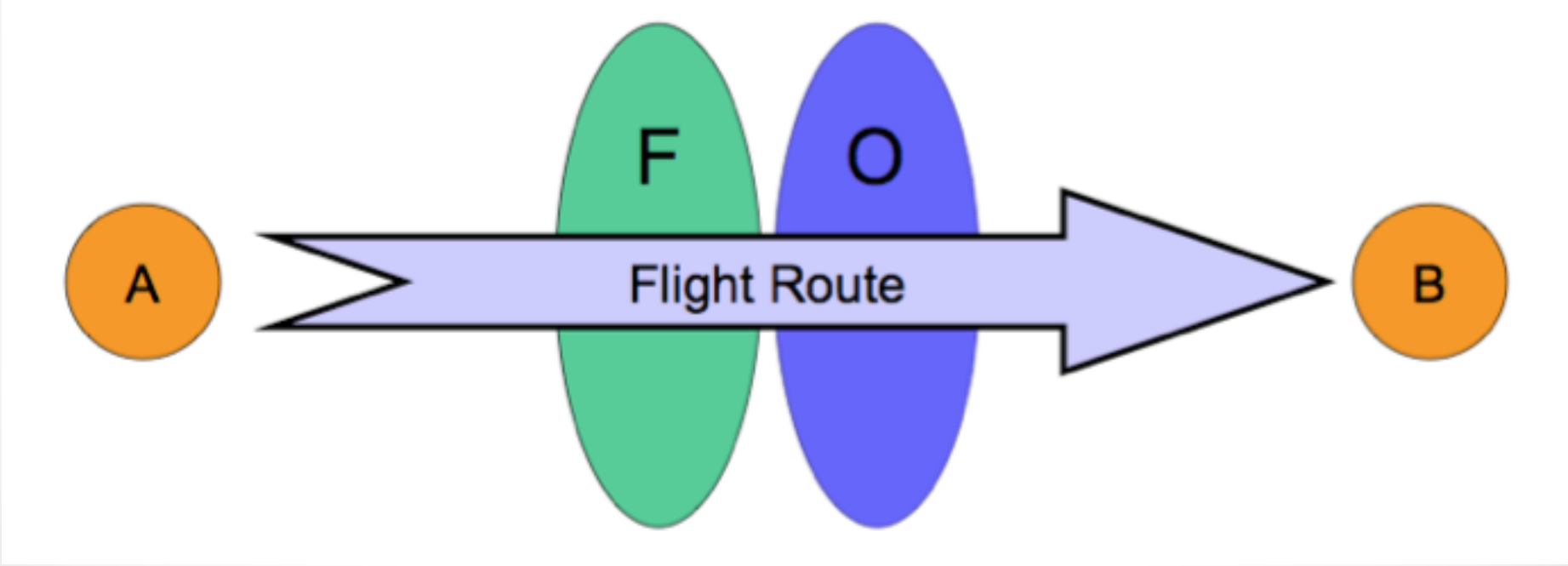


FSS

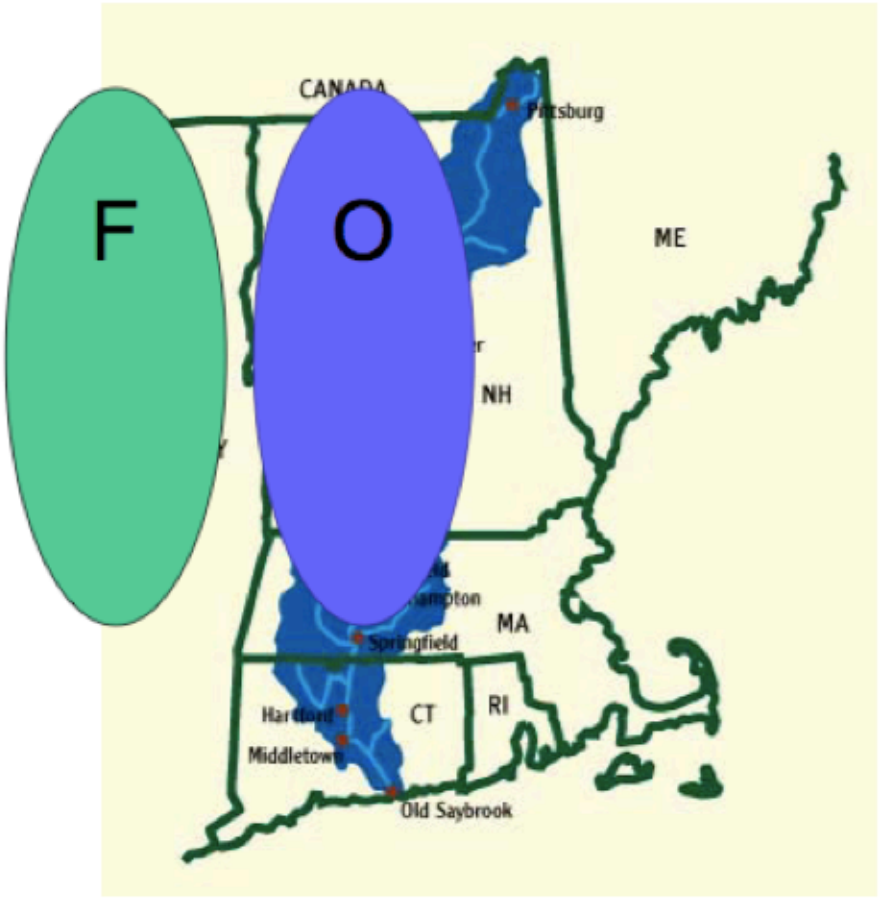
User Needs



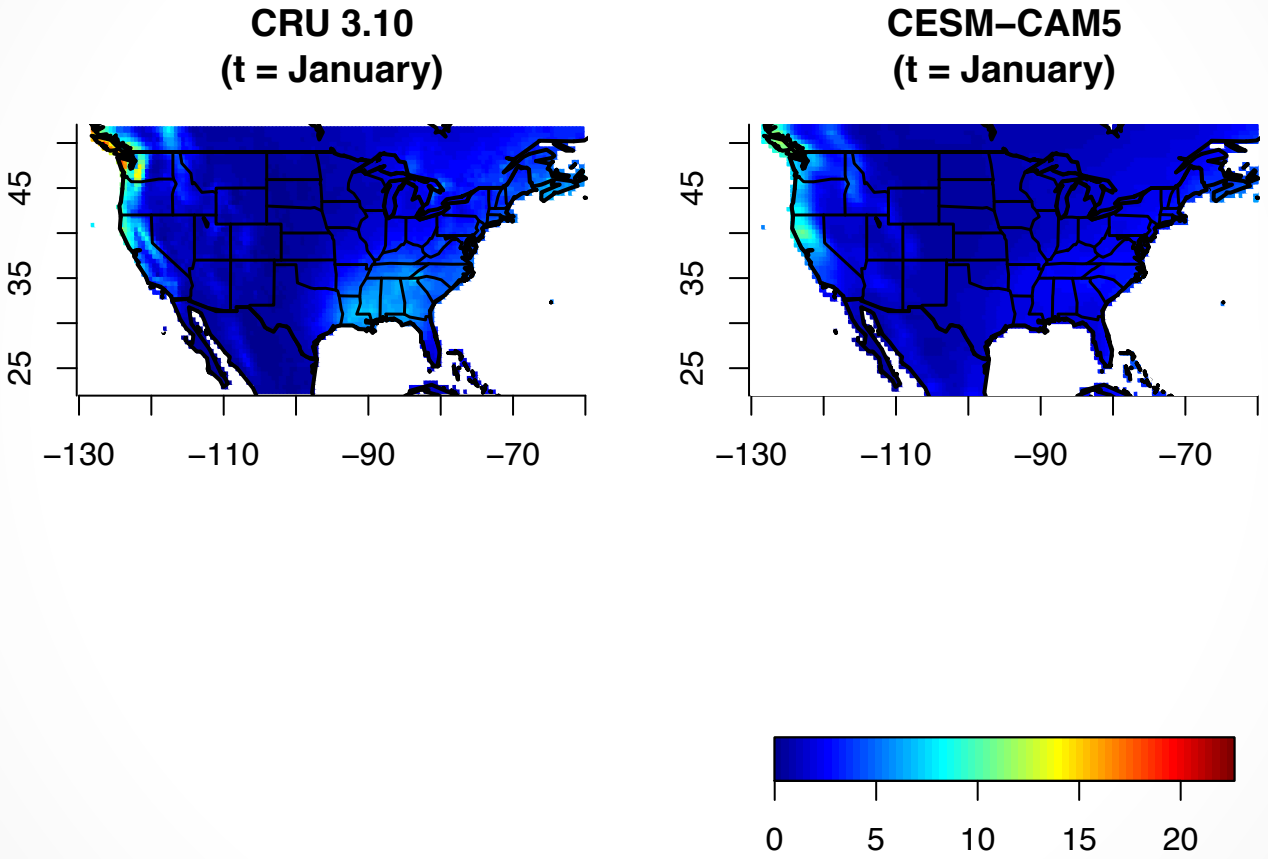
User Needs



User Needs

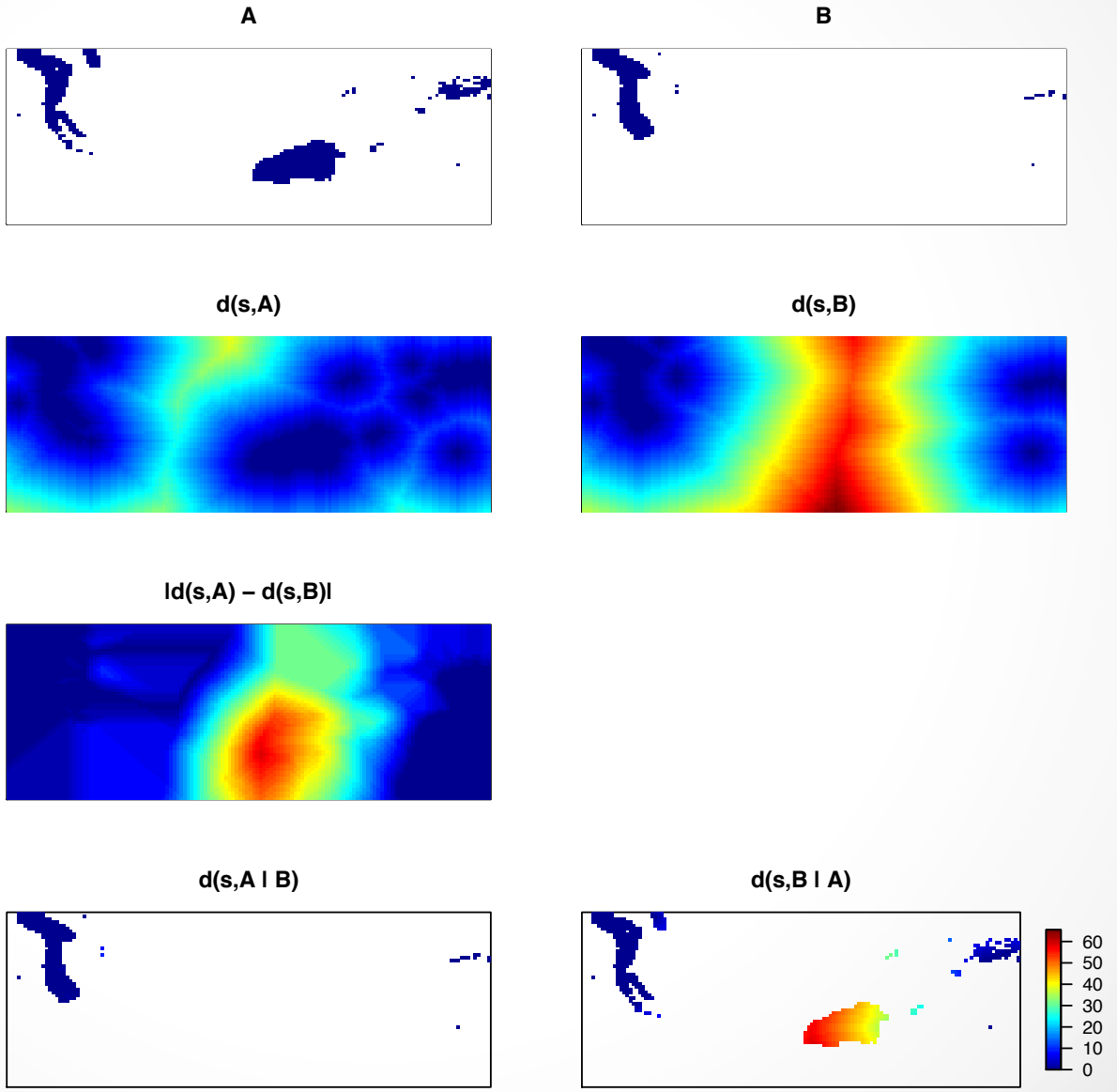


Current Climate: Precipitation (mm)



Location Error Measures

Binary fields obtained via setting all values below 5 mm to zero.



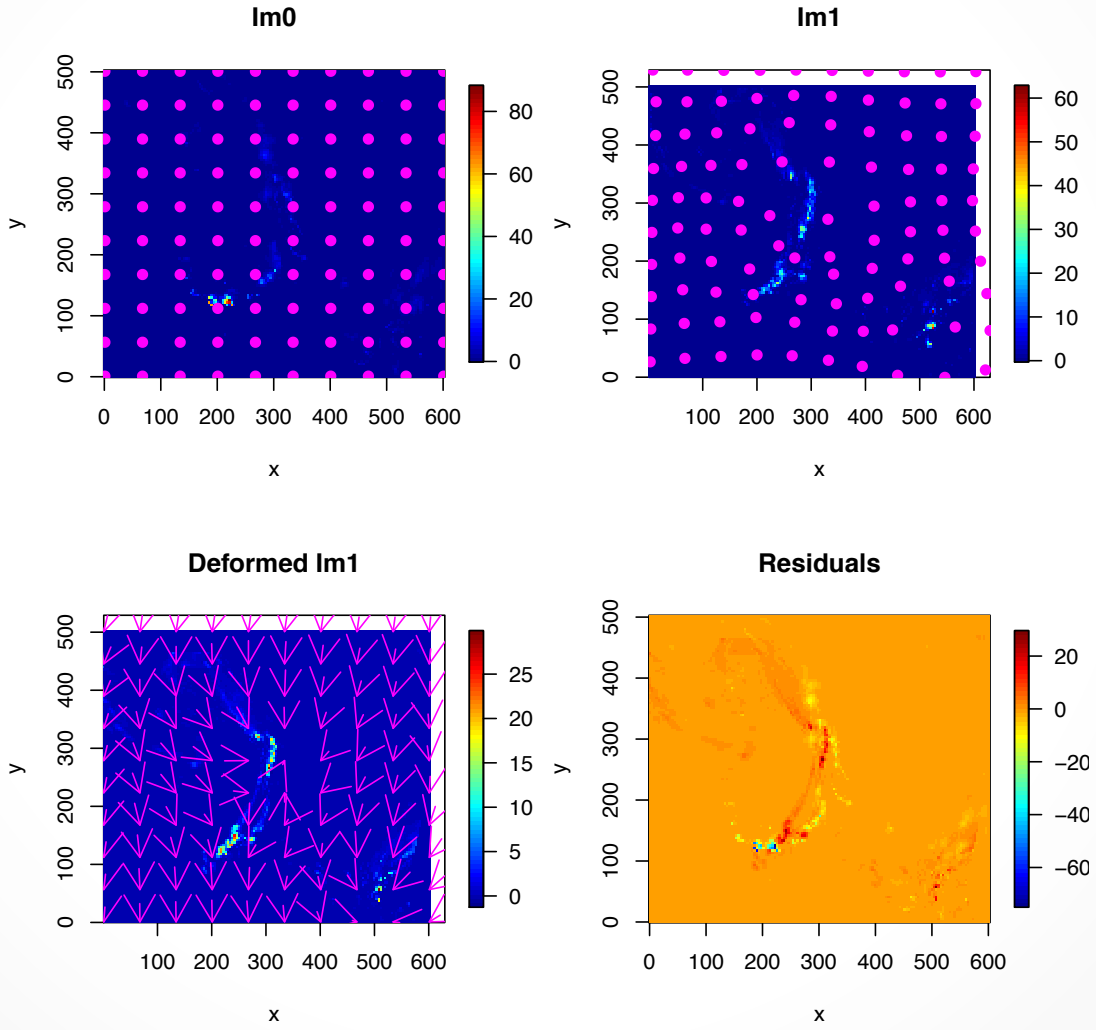
Location Error Measures

Threshold (mm)	0	0.1	1	2	5	10	15	20
Hausdorff distance	0	0	10.6	19.6	59.1	9.2	215.4	0
Baddeley's Δ metric	0	0	1.80	4.0	21.4	2.7	149.6	0
Mean Error Distance	0	0	0.2	1.4	21.9	2.5	0.5	0
metrV	0	0	13.85	15.77	21.14	5.44	72.18	0
FQI	-	0	0.42	0.70	1.93	0.14	-	-

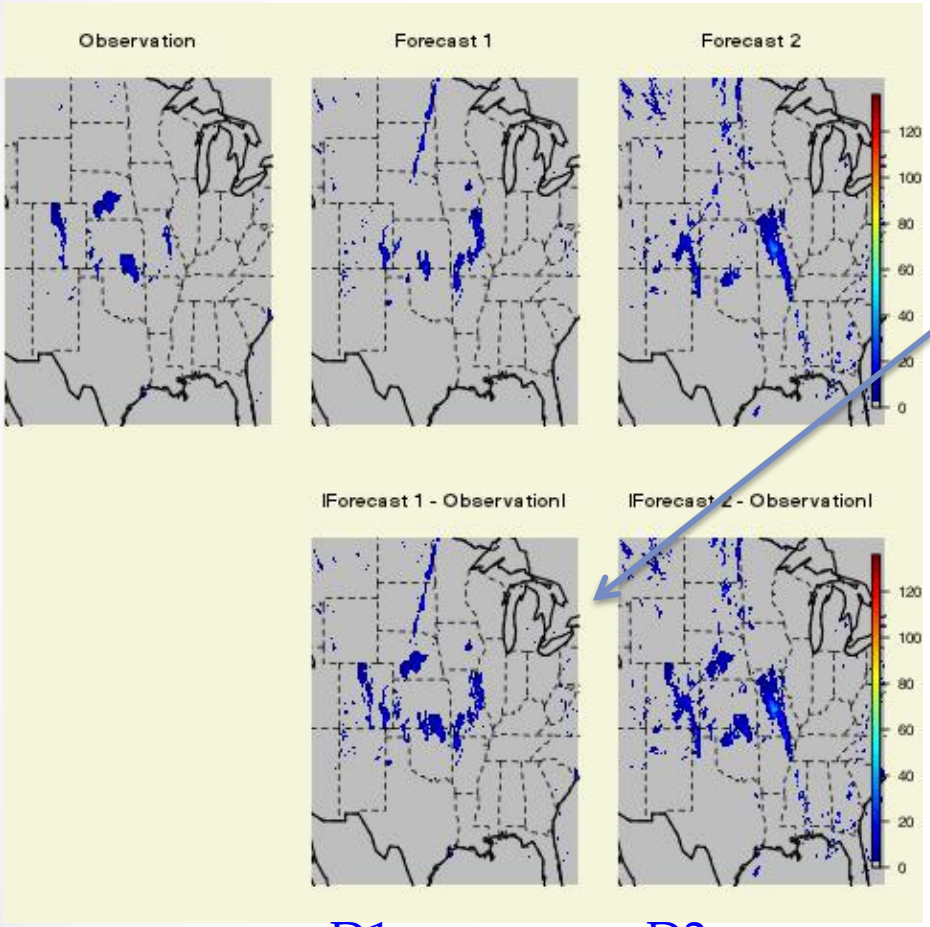
Field Deformation

Above Figure from Johan Lindström

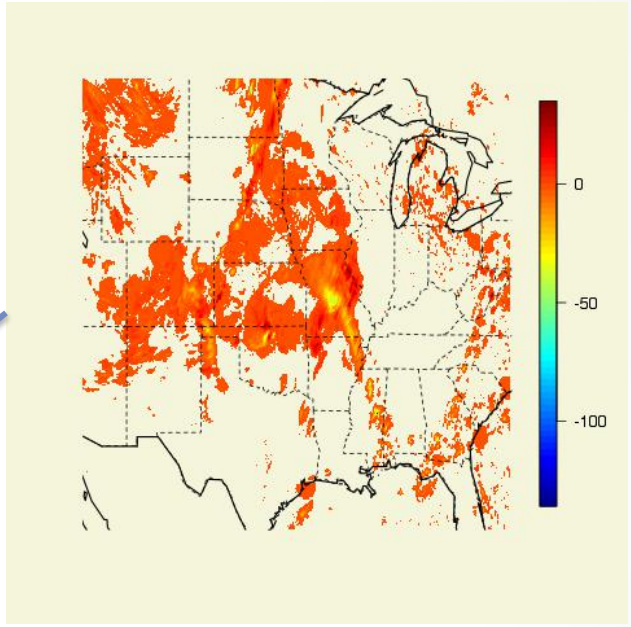
Field Deformation

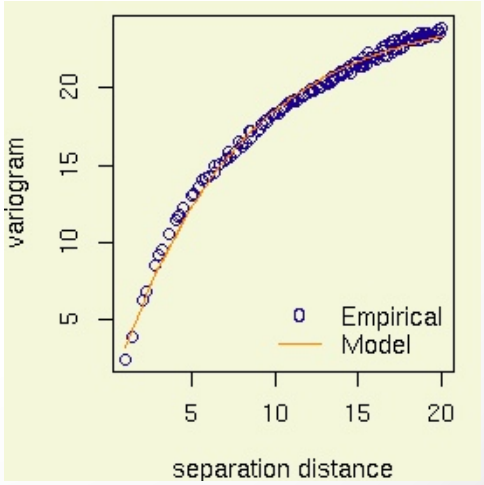


Spatial Prediction Comparison Test



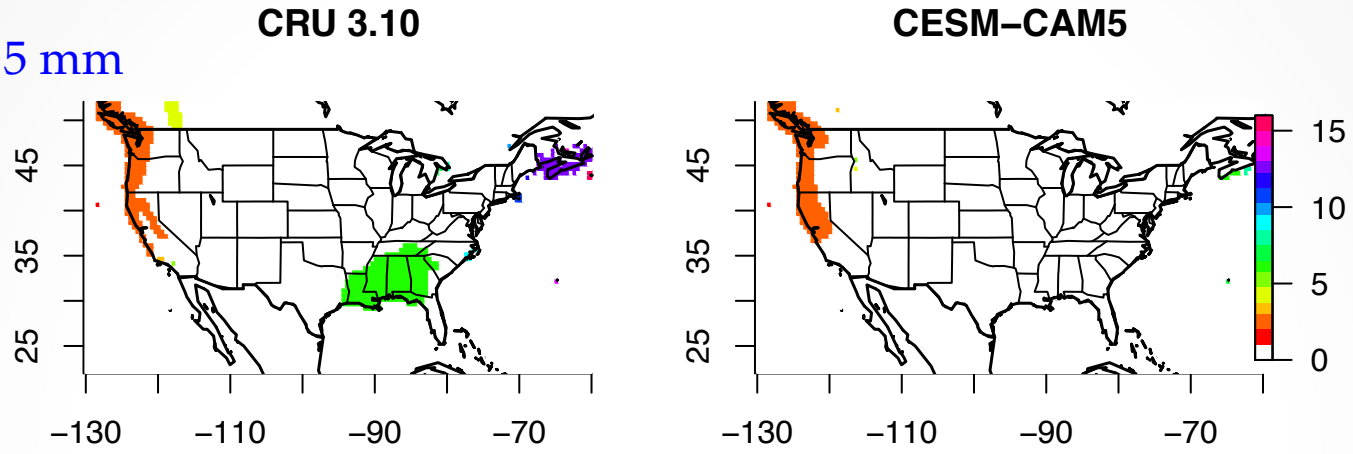
D1 D2



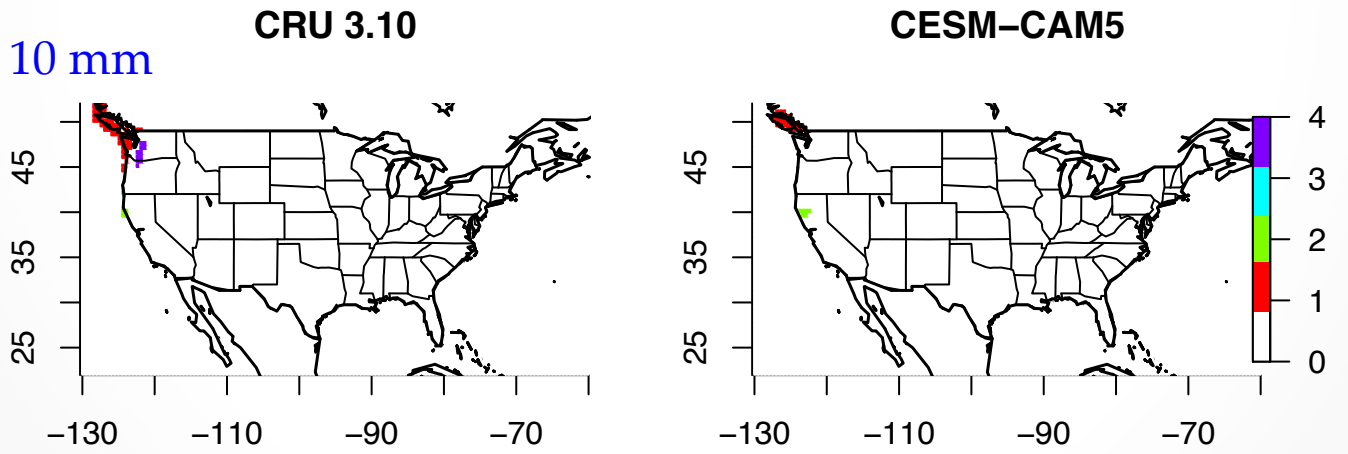


Feature-based Methods

Threshold = 5 mm

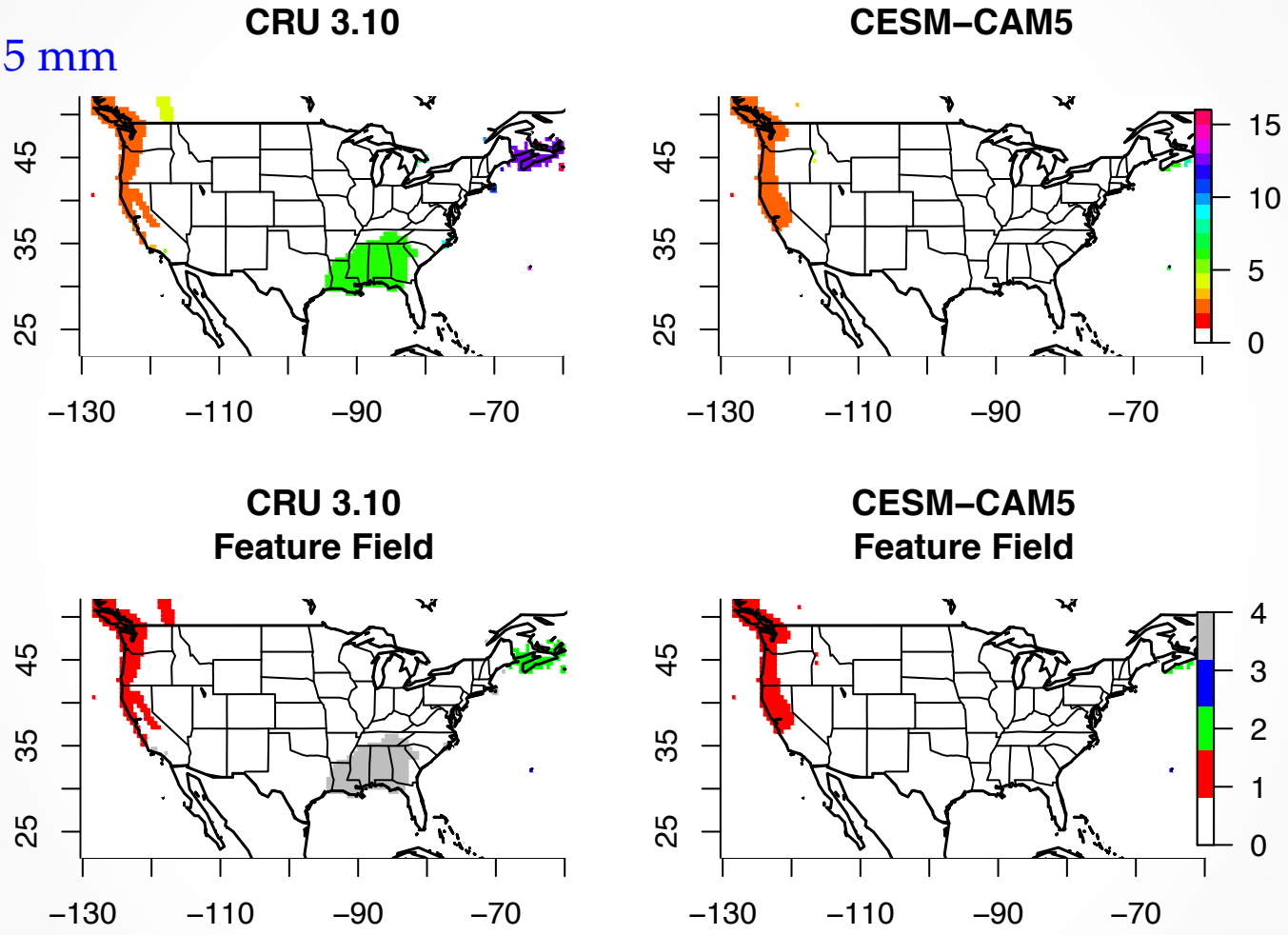


Threshold = 10 mm



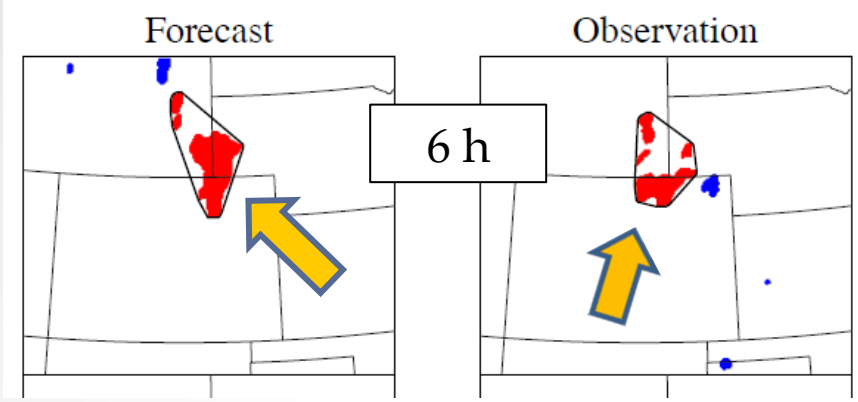
Feature-based Methods

Threshold = 5 mm



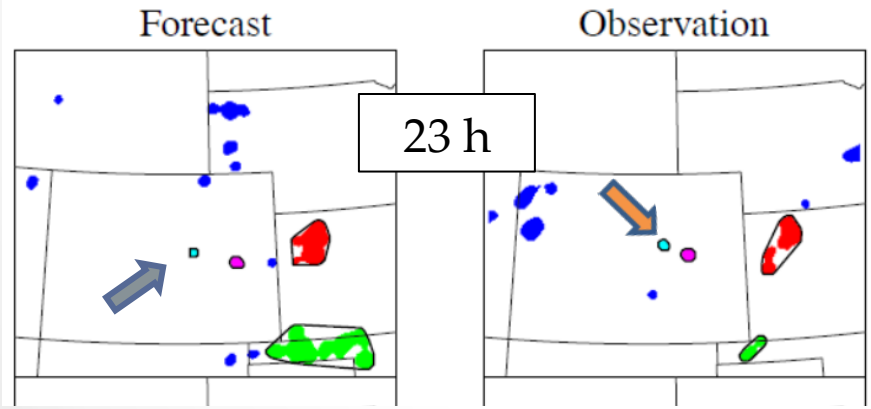
Same as above, but features have been merged and matched

Feature-based Methods



Area ratio	1.5
Intersection area / Obs area	0.51
Centroid distance	31 km
50th percentile intensity ratio	0.98
90th percentile intensity ratio	1.10

Convolution radius = 2 grid boxes; Threshold = 4 mm h^{-1}



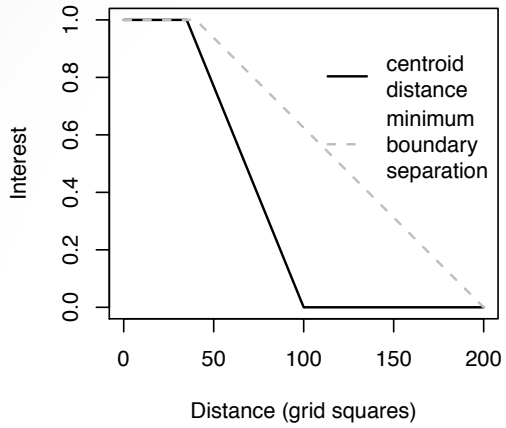
Area ratio	0.70
Intersection area / Obs area	0.06
Centroid distance	19 km
50th percentile intensity ratio	1.14
90th percentile intensity ratio	0.78

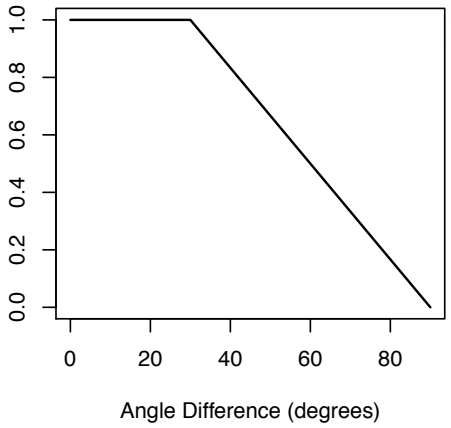
Results show (1) forecasts have some skill in capturing these events and (2) in which aspects the forecasts need improvement

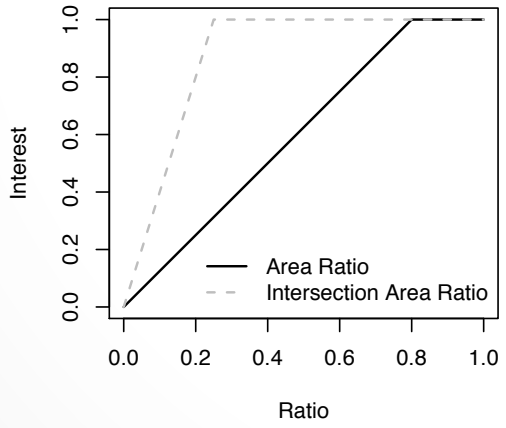
Ex: 90th percentile of precipitation; storm placement/timing

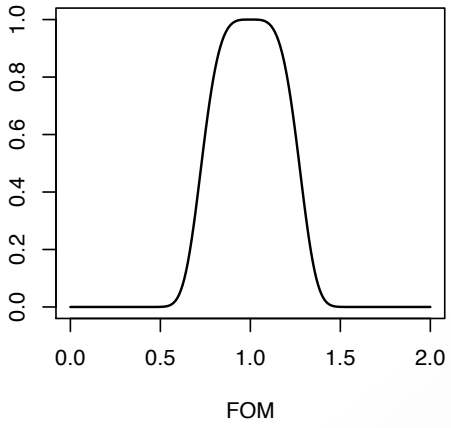
Feature-based Methods

Fuzzy Logic Interest Maps









This is the end

- SpatialVx is an R package (in the works) for doing spatial verification. Most of the techniques shown in this presentation are already available in the package.
- MesoVICT is the second phase of a spatial forecast verification methods inter-comparison project.

http://www.ral.ucar.edu/projects/icp